Update
Neural Network based Jet Charge Tagger

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Update

Since the pre-blessing talk (02/17)

- bug fix for Q_{jet} computation $\rightarrow$ ϵD^2 slightly changed
- computed NNJQT performance with exclusion of SLT tagged events
- considered track probability optimization on three samples
  - $\rightarrow$ tracks with L00 hits
  - $\rightarrow$ SI tracks without L00 hits
  - $\rightarrow$ **COT only tracks**

Updated ϵD^2 numbers

Q_{jet} computed with no separating tracks with and without L00 hits **FIXED**

Old numbers were...

	ϵ,%	effective D, %	ϵD^2
e+SVT combined	95.47 ± 0.15	9.77 ± 0.18	$\mathbf{0.912 \pm 0.034}$
μ+SVT combined	95.73 ± 0.12	9.45 ± 0.16	$\mathbf{0.855 \pm 0.029}$

New numbers are...

e+SVT combined	95.48 ± 0.15	9.80 ± 0.16	$\mathbf{0.917 \pm 0.031}$
μ+SVT combined	95.72 ± 0.12	9.90 ± 0.15	$\mathbf{0.938 \pm 0.029}$

Soft Lepton Tagger Exclusion

Evaluated NNJQT performance with events
not tagged by SET (Vivek's) or SMT (Gavril's)

Apply cut on **Likelihood >5%** for SLT (as in mixing analyses)

SLT tagged events not counted in ϵ denominator
D binning in jet type and $|Q_{jet}|P_{nn}$

$\epsilon_{SET} = 3.23\%$ $\epsilon_{SMT} = 4.41\%$

	ϵ,%	effective D, %	ϵD^2
e+**SVT**	95.12 ± 0.15	8.10 ± 0.17	**0.624 ± 0.026**
μ+**SVT**	95.38 ± 0.13	7.98 ± 0.15	**0.607 ± 0.023**

Loss of 1-2% in dilution, ϵD^2 still high

SLT and NNJQT correlations

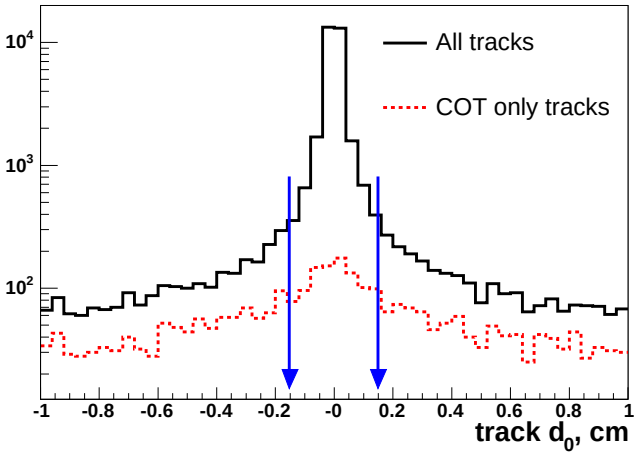
Measure of ϵ and D of NNJQT on the overlap sample

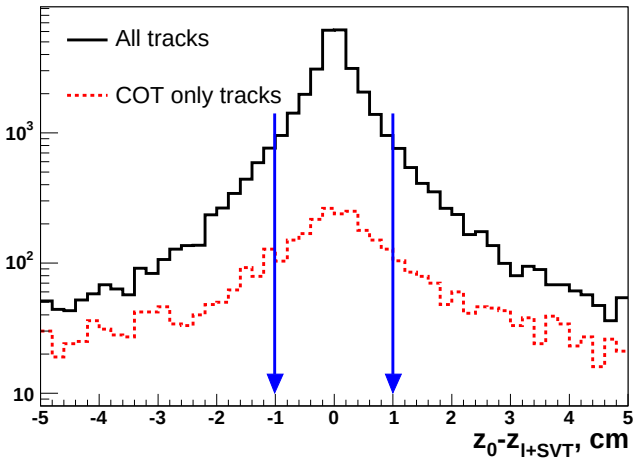
No binning for NNJQT, no cuts Likelihood>5% for SET and SMT

μ+SVT sample

Subsample	ϵ	D
SMT and NNJQT		
overlap	4.41 ± 0.03 %	24.1 ± 1.0 %
decisions agree	3.17 ± 0.02 %	37.2 ± 1.1 %
decisions disagree	1.24 ± 0.01 %	9.74 ± 1.8 %
SET and NNJQT		
overlap	3.23 ± 0.02 %	19.2 ± 1.1 %
decisions agree	2.23 ± 0.02 %	28.0 ± 1.3 %
decisions disagree	1.00 ± 0.01 %	0.5 ± 2.1 %

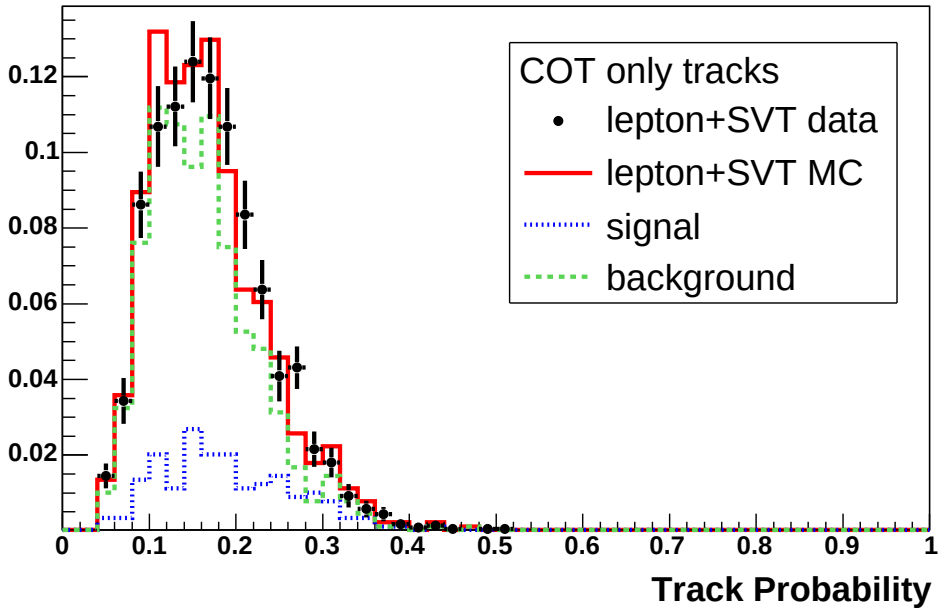
Track Probability for COT only tracks





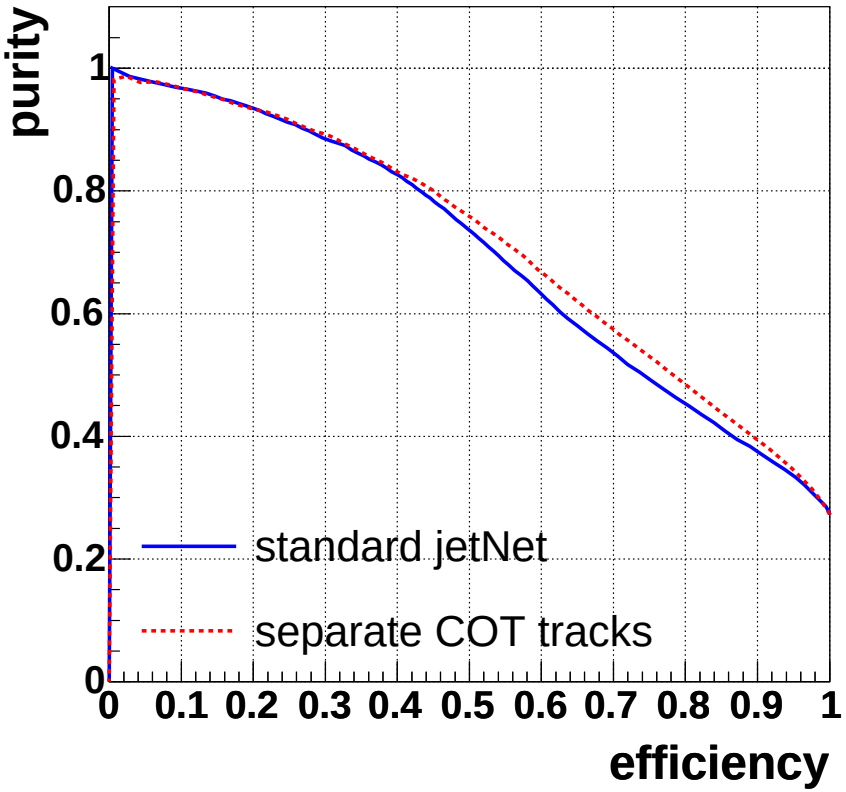
Optimize trackNet separately on
COT only tracks and **SI without L00**
to exploit different d_0 resolution

very few COT only tracks in jets (2.7%)
because of pre-clustering cuts on d_0 and Δz_0



Performance of New Optimization

Effect on jetNet



Tagging power measurement

0.934 ± 0.034 % e+SVT

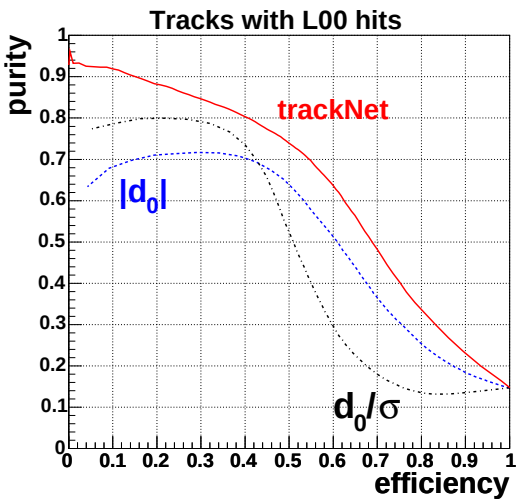
0.950 ± 0.029 % e+SVT

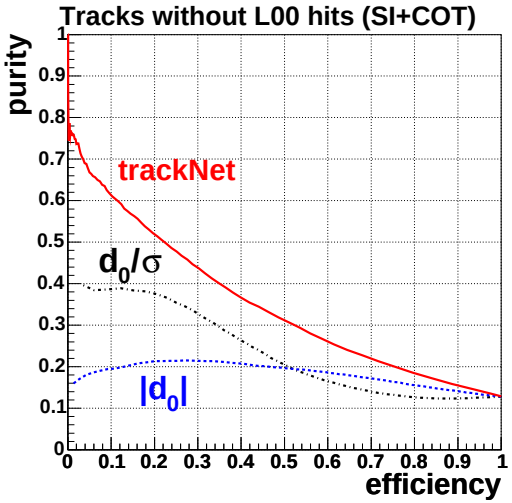
to be compared to "standard" NNJQT

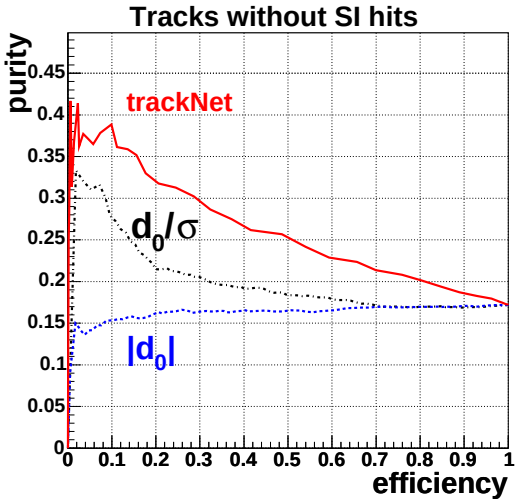
0.917 ± 0.031 % e+SVT

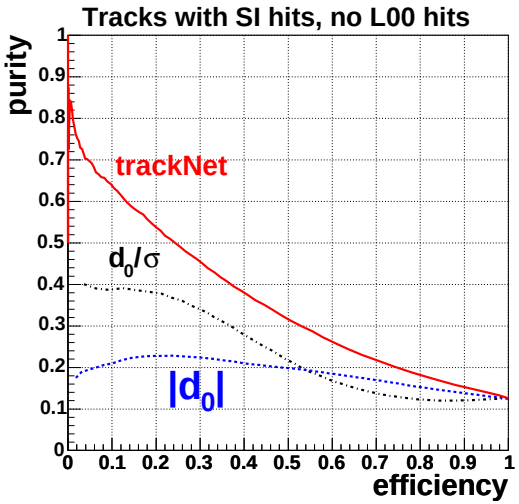
0.938 ± 0.029 % e+SVT

d_0 and d_0/σ contribution to trackNet









Curves for d_0 and d_0/σ show contribution to the trackNet performance

Change of d_0 and d_0/σ importance when COT tracks are separated is negligible

Not really necessary to optimize separately for COT only tracks

Summary

Updated CDF note 7482, included items discussed today

Final NNJQT ϵD^2 results are

0.917 ± 0.031 % e+SVT

0.938 ± 0.029 % e+SVT